UNIT – 2 SETTING UP ANDROID ENVIRONMENT

1. What is Android Emulator?

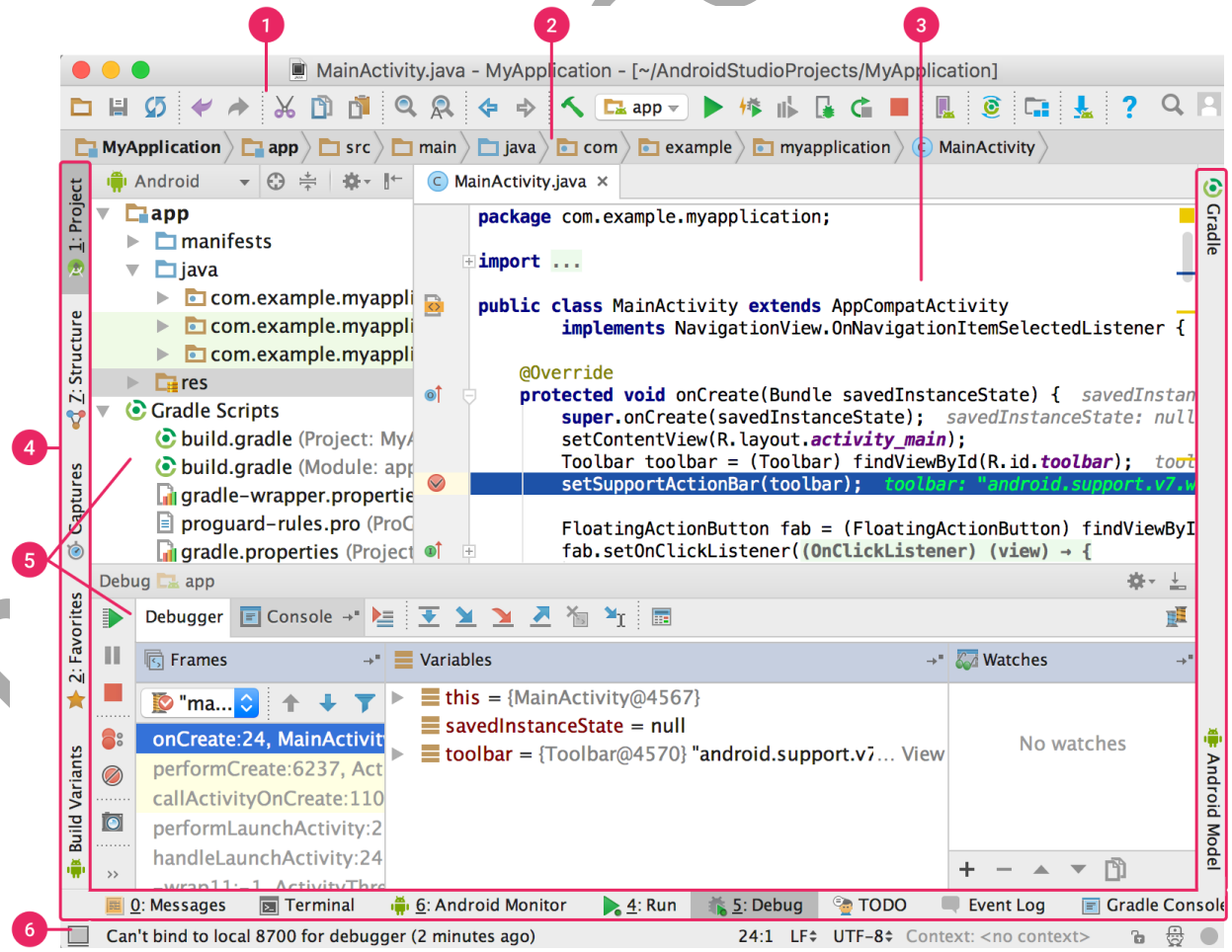
The Android Emulator simulates Android devices on your computer so that you can test your application on a variety of devices and Android API levels without needing to have each physical device.

The emulator provides almost all of the capabilities of a real Android device. You can simulate incoming phone calls and text messages, specify the location of the device, simulate different network speeds, simulate rotation and other hardware sensors, access the Google Play Store, and much more.

Testing your app on the emulator is in some ways faster and easier than doing so on a physical device. For example, you can transfer data faster to the emulator than to a device connected over USB.

The emulator comes with predefined configurations for various Android phone, tablet, Wear OS, and Android TV devices.

2. Android IDE Introduction (User Interface):



1. The **toolbar** lets you carry out a wide range of actions, including running your app and launching Android tools.
2. The **navigation bar** helps you navigate through your project and open files for editing. It provides a more compact view of the structure visible in the **Project** window.
3. The **editor window** is where you create and modify code. Depending on the current file type, the editor can change. For example, when viewing a layout file, the editor displays the Layout Editor.
4. The **tool window bar** runs around the outside of the IDE window and contains the buttons that allow you to expand or collapse individual tool windows.
5. The **tool windows** give you access to specific tasks like project management, search, version control, and more. You can expand them and collapse them.
6. The **status bar** displays the status of your project and the IDE itself, as well as any warnings or messages.

You can organize the main window to give yourself more screen space by hiding or moving toolbars and tool windows. You can also use keyboard shortcuts to access most IDE features.

3. What is SDK manager in Android Studio?

The sdkmanager is a command line tool that allows you to view, install, update, and uninstall packages for the Android SDK. If you're using Android Studio, then you do not need to use this tool and you can instead manage your SDK packages from the IDE.

4. What is Android Virtual Device (AVD) and Steps to create it?

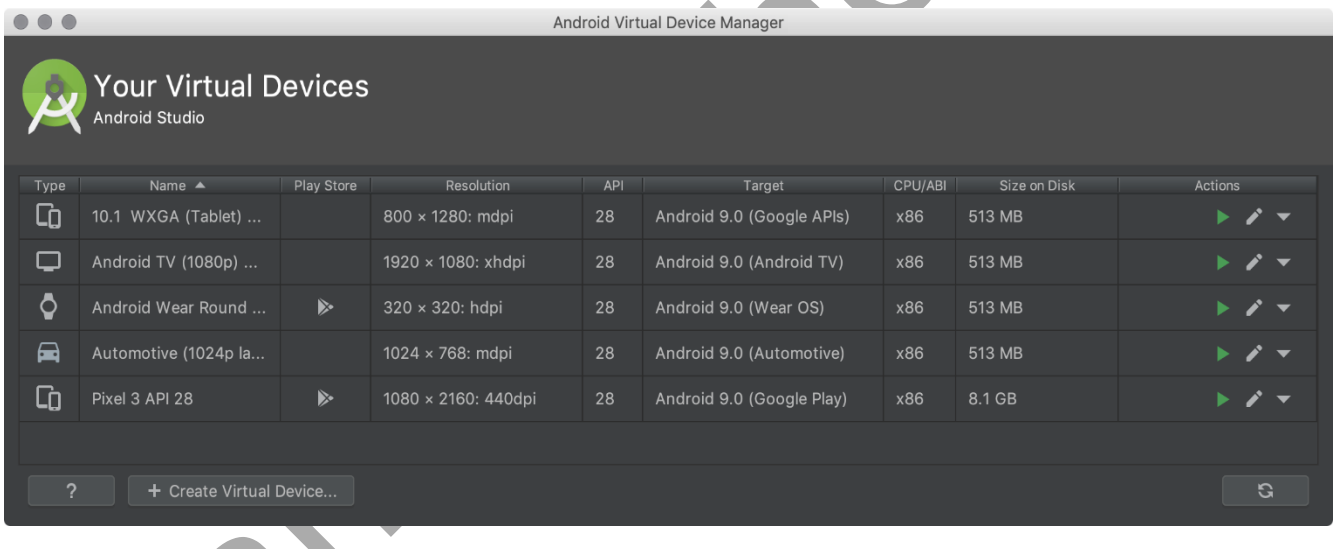
An Android Virtual Device (AVD) is a configuration that defines the characteristics of an Android phone, tablet, Wear OS, Android TV, or Automotive OS device that you want to simulate in the Android Emulator. The AVD Manager is an interface you can launch from Android Studio that helps you create and manage AVDs.

To open the AVD Manager, do one of the following:

- Select **Tools > AVD Manager**.
- Click **AVD Manager**  in the toolbar.

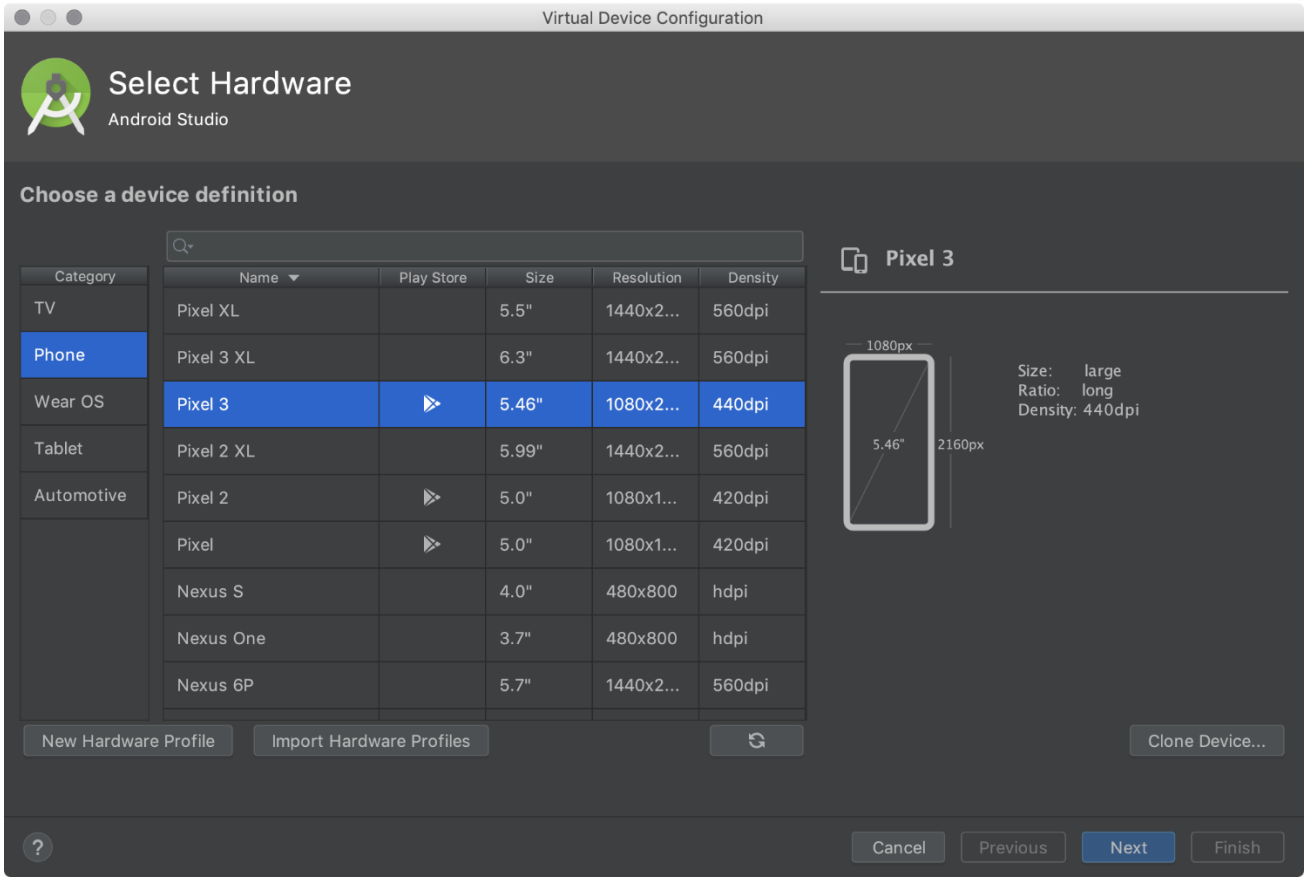
Steps to Create an AVD:

1. Open the AVD Manager by clicking **Tools > AVD Manager**.



2. Click **Create Virtual Device**, at the bottom of the AVD Manager dialog.

   The **Select Hardware** page appears.

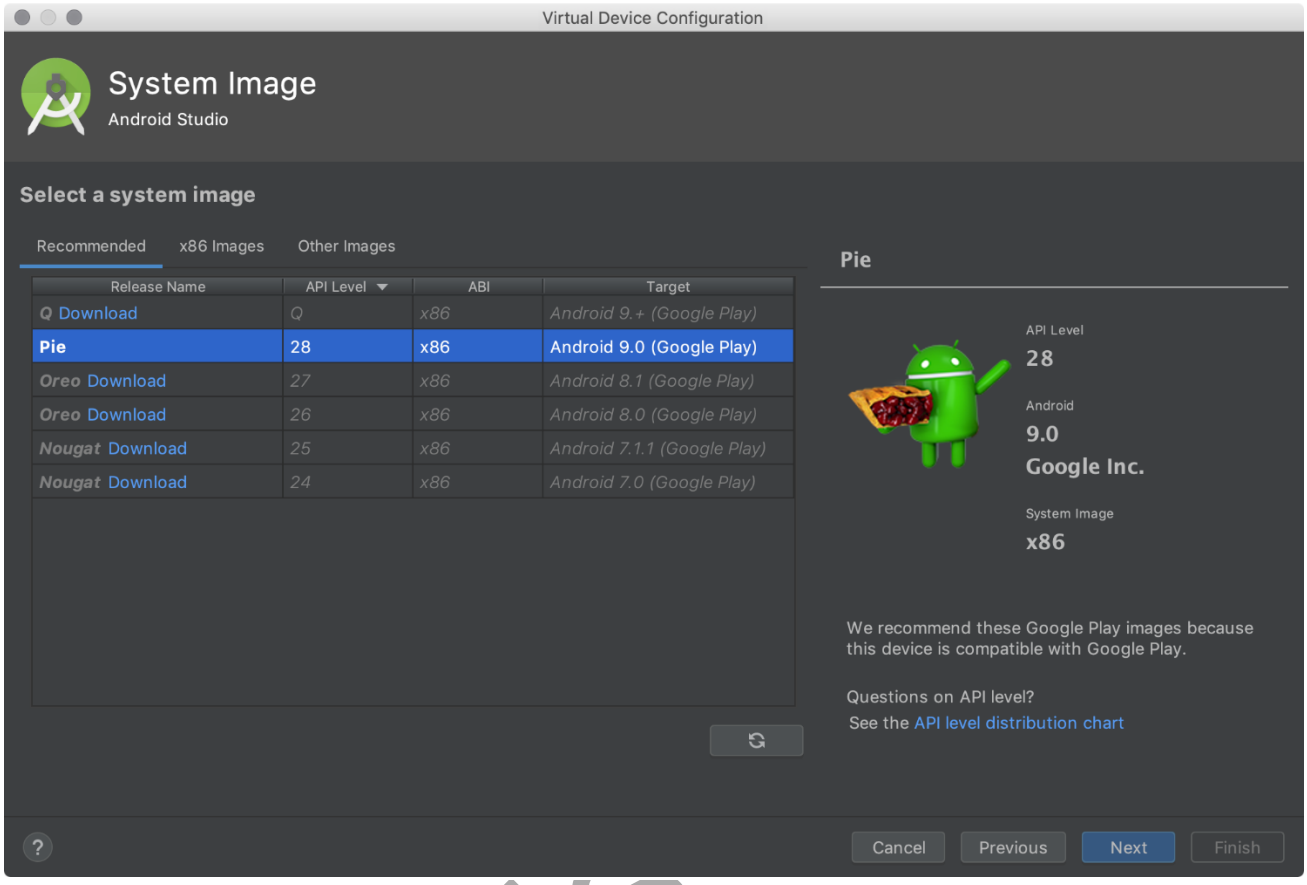


Notice that only some hardware profiles are indicated to include **Play Store**. This indicates that these profiles are fully CTS compliant and may use system images that include the Play Store app.

3. Select a hardware profile, and then click **Next**.

   If you don't see the hardware profile you want, you can create or import a hardware profile.

   The **System Image** page appears.



4. Select the system image for a particular API level, and then click **Next**.

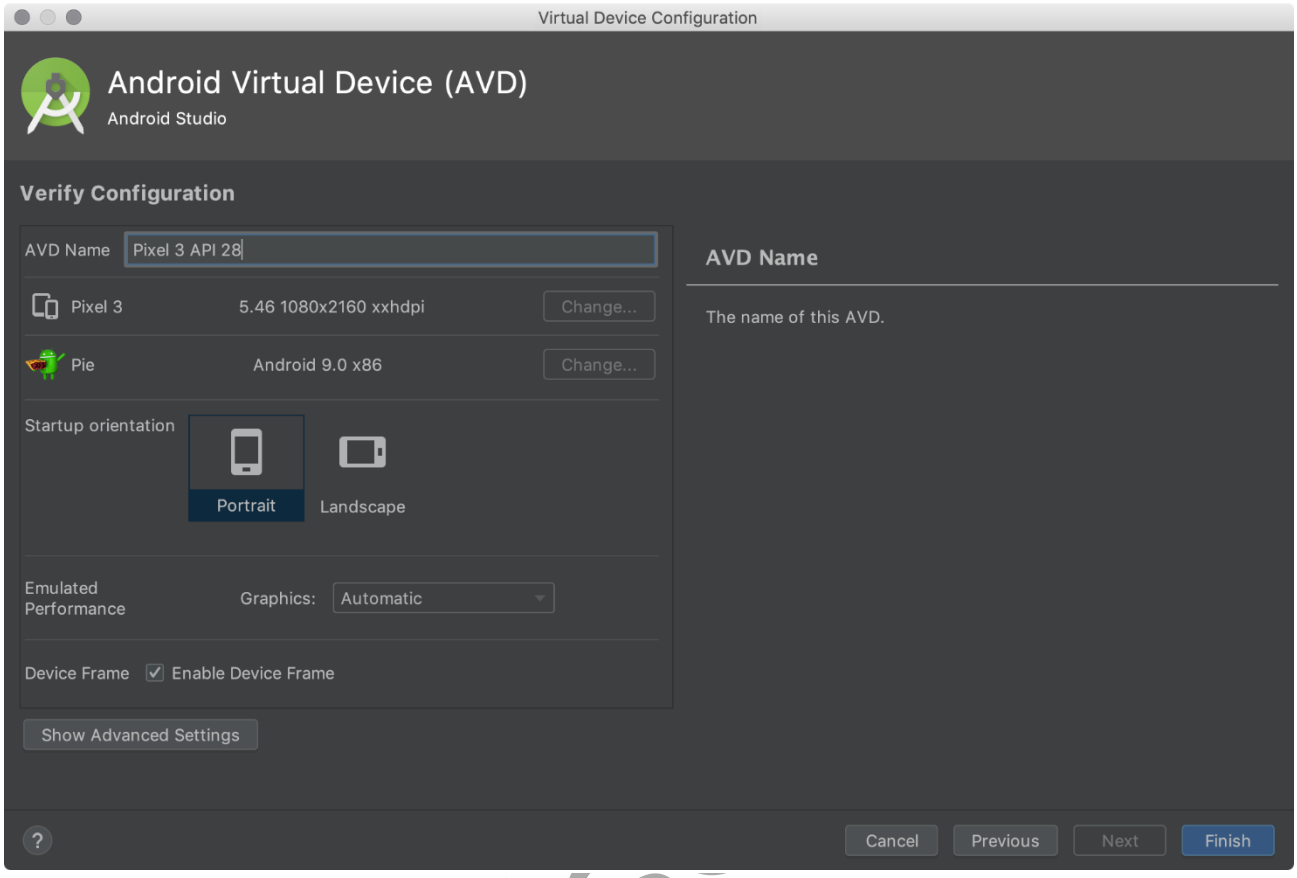
   The **Recommended** tab lists recommended system images. The other tabs include a more complete list. The right pane describes the selected system image. x86 images run the fastest in the emulator.

   If you see **Download** next to the system image, you need to click it to download the system image. You must be connected to the internet to download it.

   The API level of the target device is important, because your app won't be able to run on a system image with an API level that's less than that required by your app, as specified in the minSdkVersion attribute of the app manifest file. For more information about the relationship between system API level and minSdkVersion, see Versioning Your Apps.

   If your app declares a <uses-library> element in the manifest file, the app requires a system image in which that external library is present. If you want to run your app on an emulator, create an AVD that includes the required library. To do so, you might need to use an add-on component for the AVD platform; for example, the Google APIs add-on contains the Google Maps library.

   The **Verify Configuration** page appears.



5. Change AVD properties as needed, and then click **Finish**.

   Click **Show Advanced Settings** to show more settings, such as the skin.

   The new AVD appears in the **Your Virtual Devices** page or the **Select Deployment Target** dialog.

To create an AVD starting with a copy:

1. From the **Your Virtual Devices** page of the AVD Manager, right-click an AVD and select **Duplicate**.

   Or click Menu ▼ and select **Duplicate**.

   The **Verify Configuration** page appears.

2. Click **Change** or **Previous** if you need to make changes on the **System Image** and **Select Hardware** pages.

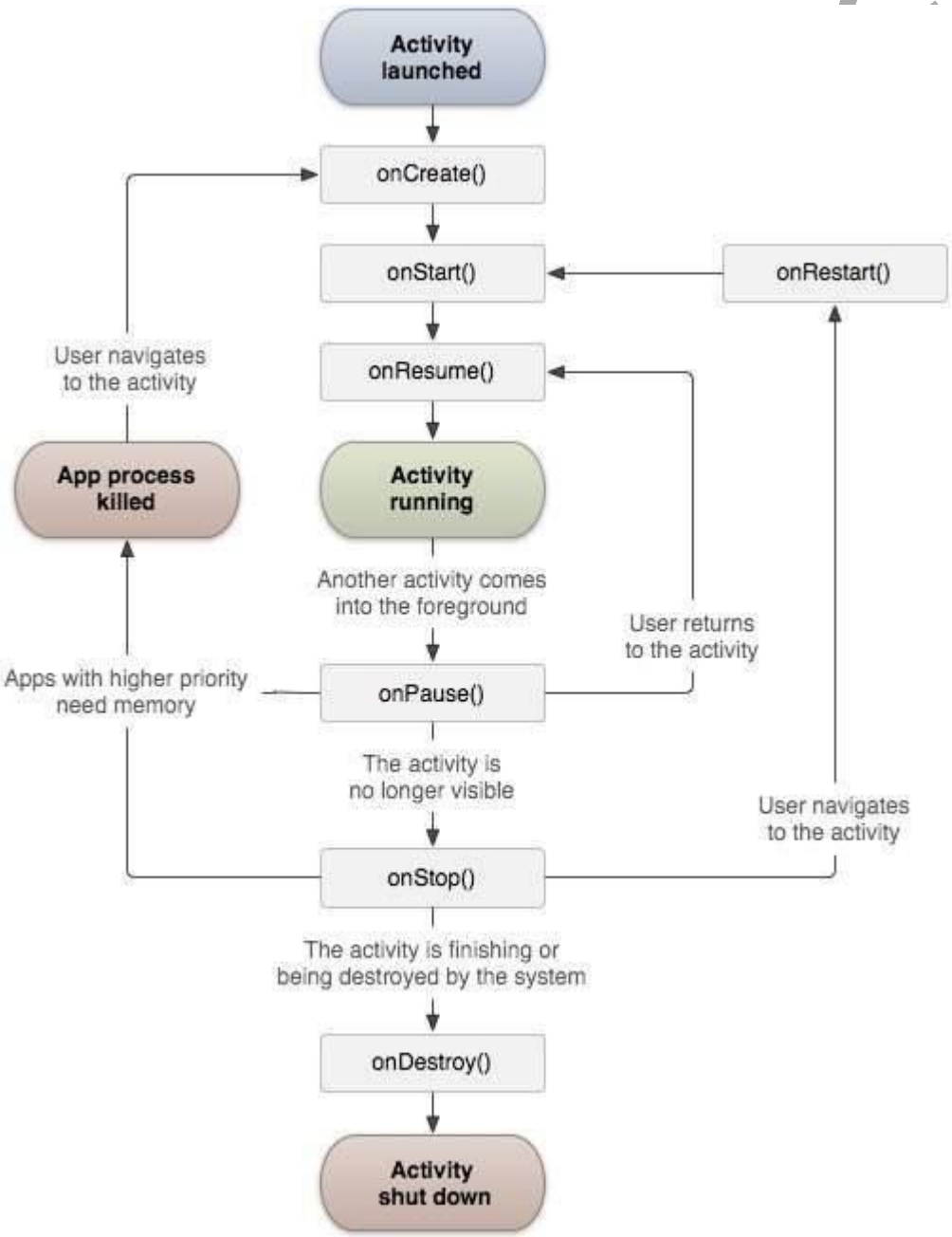
3. Make your changes, and then click **Finish**.

   The AVD appears in the **Your Virtual Devices** page.

5. What is Activity in Android Studio while creating the App?

An activity represents a single screen with a user interface just like window or frame of Java.Android activity is the subclass of ContextThemeWrapper class.

If you have worked with C, C++ or Java programming language then you must have seen that your program starts from **main()** function. Very similar way, Android system initiates its program with in an **Activity** starting with a call on *onCreate()* callback method. There is a sequence of callback methods that start up an activity and a sequence of callback methods that tear down an activity as shown in the below Activity life cycle diagram: (*image courtesy : android.com*)

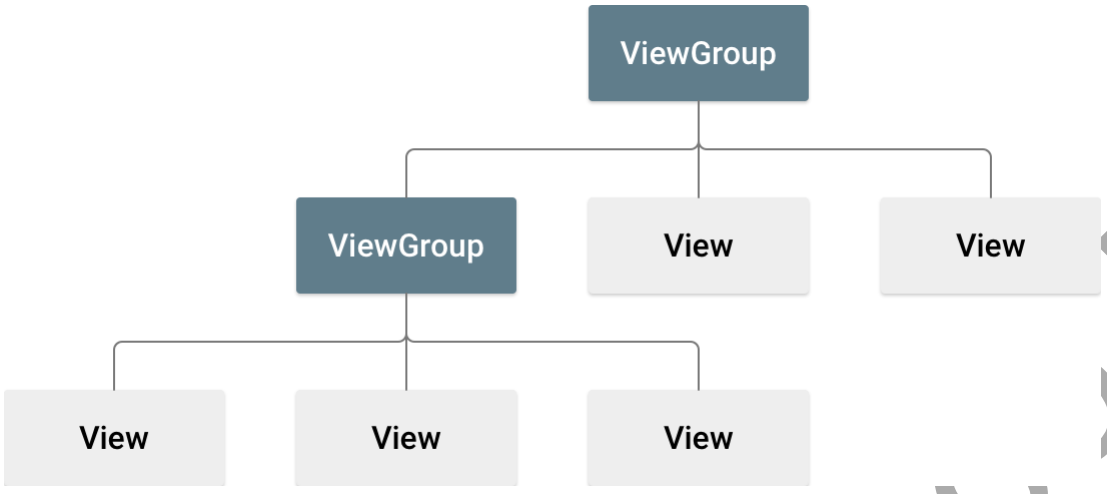


The Activity class defines the following call backs i.e. events. You don't need to implement all the callbacks methods. However, it's important that you understand each one and implement those that ensure your app behaves the way users expect.

Sr.No	Callback & Description
1	**onCreate()** This is the first callback and called when the activity is first created.
2	**onStart()** This callback is called when the activity becomes visible to the user.
3	**onResume()** This is called when the user starts interacting with the application.
4	**onPause()** The paused activity does not receive user input and cannot execute any code and called when the current activity is being paused and the previous activity is being resumed.
5	**onStop()** This callback is called when the activity is no longer visible.
6	**onDestroy()** This callback is called before the activity is destroyed by the system.
7	**onRestart()** This callback is called when the activity restarts after stopping it.

6. Explain different Layouts of Android Studio:

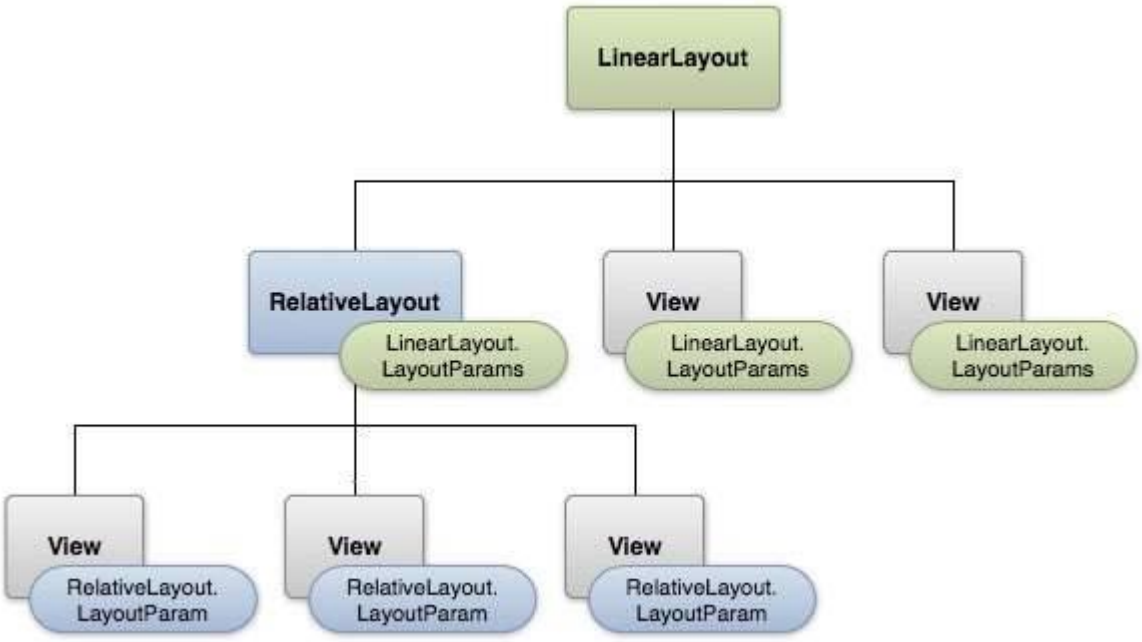
A layout defines the structure for a user interface in your app, such as in an activity. All elements in the layout are built using a hierarchy of View and ViewGroup objects. A View usually draws something the user can see and interact with. Whereas a ViewGroup is an invisible container that defines the layout structure for View and other ViewGroup objects, as shown in figure 1.



The basic building block for user interface is a **View** object which is created from the View class and occupies a rectangular area on the screen and is responsible for drawing and event handling. View is the base class for widgets, which are used to create interactive UI components like buttons, text fields, etc.

The **ViewGroup** is a subclass of **View** and provides invisible container that hold other Views or other ViewGroups and define their layout properties.

At third level we have different layouts which are subclasses of ViewGroup class and a typical layout defines the visual structure for an Android user interface and can be created either at run time using **View/ViewGroup** objects or you can declare your layout using simple XML file **main_layout.xml** which is located in the res/layout folder of your project.



Android Layout Types

There are number of Layouts provided by Android which you will use in almost all the Android applications to provide different view, look and feel.

Sr.No	Layout & Description
1	**Linear Layout** LinearLayout is a view group that aligns all children in a single direction, vertically or horizontally.
2	**Relative Layout** RelativeLayout is a view group that displays child views in relative positions.
3	**Table Layout** TableLayout is a view that groups views into rows and columns.
4	**Absolute Layout** AbsoluteLayout enables you to specify the exact location of its children.
5	**Frame Layout** The FrameLayout is a placeholder on screen that you can use to display a single view.
6	**List View** ListView is a view group that displays a list of scrollable items.
7	**Grid View** GridView is a ViewGroup that displays items in a two-dimensional, scrollable grid.

Layout Attributes

Each layout has a set of attributes which define the visual properties of that layout. There are few common attributes among all the layouts and their are other attributes which are specific to that layout. Following are common attributes and will be applied to all the layouts:

Sr.No	Attribute & Description
1	**android:id** This is the ID which uniquely identifies the view.
2	**android:layout_width** This is the width of the layout.
3	**android:layout_height** This is the height of the layout
4	**android:layout_marginTop** This is the extra space on the top side of the layout.
5	**android:layout_marginBottom** This is the extra space on the bottom side of the layout.
6	**android:layout_marginLeft** This is the extra space on the left side of the layout.
7	**android:layout_marginRight** This is the extra space on the right side of the layout.
8	**android:layout_gravity** This specifies how child Views are positioned.
9	**android:layout_weight** This specifies how much of the extra space in the layout should be allocated to the View.
10	**android:layout_x** This specifies the x-coordinate of the layout.
11	**android:layout_y** This specifies the y-coordinate of the layout.
12	**android:layout_width** This is the width of the layout.
13	**android:paddingLeft** This is the left padding filled for the layout.
14	**android:paddingRight** This is the right padding filled for the layout.

15	**android:paddingTop** This is the top padding filled for the layout.
16	**android:paddingBottom** This is the bottom padding filled for the layout.